Serial No. 10/575,676
Art Unit 2624

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicants:	Jill M. Boyce et al.	Art Unit:	2624
Filed:	October 25, 2006	Examiner:	Anad P. Bhatnagar
Serial No.:	10/575,676		
For	TECHNIQUE FOR BIT-ACCURATE FILM GRAIN SIMULATION		

Commissioner for Patents
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APPEAL BRIEF

Applicants appeal the rejection of claims 15-20 as presented in applicants' Amendment after Final Rejection, filed May, 17, 2010, in response to the Final Rejection made in the Office Action dated March 4, 2010. In furtherance of applicants' Notice of Appeal filed June 22, 2010, applicants submit this appeal brief.

CERTIFICATE OF MAILING

I hereby certify that this amendment is being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Mail Stop Appeal Brief, Commissioner for Patents, Alexandria, Virginia 22313-1450 on:

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Lois Greene

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TABLE OF CONTENTS:

1. Real Party in Interest\

THOMSON LICENSING remains the real party in interest by virtue of an assignment from the inventors Jill M. Boyce et al. to Thomson Licensing SA, submitted to the United States Patent and Trademark Office on April 11, 2006 for recording, but never recorded, and a subsequent assignment from Thomson Licensing SA to Thomson Licensing, recorded in the United States Patent and Trademark Office at reel/frame 017797/0176 on April 11, 2006.

2. Related Appeals and Interferences

None

3. Status of Claims

Claims 15-20 remain pending and stand rejected, prompting this appeal. Applicants previously cancelled claims 1-3, 8-10 and 21 and have withdrawn claims 4-7 and 11-14 without prejudice.

A copy of the claims appears in Section 8.

4. Status of Amendments

Applicants filed an amendment under 37 CFR §1.111 with the USPTO on June 2, 2009 in response to a non-final Office Action mailed March 31, 2009. The USPTO determined that applicants' amendment was non-compliant in a paper mailed November 12, 2009. Applicant later resubmitted their amendment on November 20, 2009. Applicants later submitted an amendment after Final Rejection under 37 C.F.R. 1.116(b) on May 17, 2010 in response to a Final Office action mailed March 4, 2010. In an Advisory action mailed June 6, 2010, the USPTO entered applicants' Amendment after Final Rejection, but maintained the Final Rejection, thus prompting this appeal.

5. **Summary of Claimed Subject Matter**

Independent Claim 15 recites

A method for simulating bit accurate film grain in an image block, comprising the steps of:

The claim preamble finds support at page 4, lines 5-15 of applicants' specification which states:

> The method of the present principles simulates film grain in accordance with film grain information transmitted with an image to which simulated grain is blended. In practice, the transmitted image typically undergoes compression (encoding) prior to transmission via one of a variety of well-known compression schemes, such as the H.264 compression scheme. With the transmitted image compressed using the H.264 compression scheme, transmission of the film grain information typically occurs via a Supplemental Enhancement Information (SEI) message.

Details of the manner in which applicants simulate "bit accurate" film grain are discussed in applicants' specification at page 6, lines 10-21, page 7, lines 1-32, and page 8, lines 1-3. In particular, page 7, lines 25-30 describe the use of a bit accurate transform to yield bit accurate film grain.

Following the preamble, claim 15 recites the step of:

computing the average of the pixel values within the image block;

The computing step finds ample support at page 8, lines 7-13 which states:

> FIGURE 2 illustrates an apparatus 200 in accordance with an illustrative embodiment of the present principles for simulating film grain on a pixel-by-pixel basis using the stored values in the film grain pool 28. The apparatus 200 includes a processing block 202 for creating an average of each 8 x 8 block of luma pixel values for comparison to the parameters **intensity_interval_lower_bound[0][i]** and **intensity_interval_upper_bound[0][i]** in the film grain SEI message to determine the correct luminance intensity interval for the current block.

Lastly, claim 15 recites the step of:

randomly selecting, as a function of the average value of the image block, a block of bit accurate film grain from among a pool of previously established blocks of bit accurate film

Ample support for the "randomly selecting" step exists at page 8, lines 14-25 which provides:

> A selector block 204 selects a k^{th} film grain block from the pool 28, using the random number generated by the uniform random number generator 16 from the polynomial modulo 128 as the block index. Thus, the noise generator 16, which generates uniformly distributed random numbers using a polynomial for the initialization process described with respect to FIG. 1, finds application in the apparatus 200 of FIG. 2 to select film grain blocks, with the random number seed reset to 1 after the pool creation process. If the resulting block index is identical to the previous one, the last bit of the index undergoes toggling. Such operation can occur using a bit-wise comparison and an XOR operator (^) as follows:
>
> previous_index = index
> index = x(k, 1) % 128
> index ^= (index == previous_index

Independent claim 19 recites the following preamble:

> *Apparatus for simulating bit accurate film grain in an image block, comprising:*

Ample support for the preamble of claim 19 appears at page 6, lines 16-21 and page 7, lines 1-12 of applicants' specification which provides:

> FIGURE 1 depicts an apparatus 10 in accordance with an illustrated embodiment of the present principles for generating a pool of film grain blocks for use in film grain simulation. The apparatus 10 typically generates a pool of 128 film grain blocks for each of as many as 8 different luminance intensity intervals. The SEI message field **num_intensity_intervals_minus1[0]** indicates one less than the number of the luminance intensity intervals.
>
> The apparatus 10 accomplishes film grain noise initialization using a specified uniform pseudo-random number polynomial generator 12 and using a specified list of 2048 8-bit Gaussian distributed random numbers stored in a look-up table 14 The look-up table 14 stores random numbers in 2's complement form in the range [-63, 63]. The list of Gaussian random numbers appears in the Appendix.
>
> According to the bit-accurate specification of the present principles, generation of the film grain blocks begins with the lowest luminance intensity interval. The uniform random number generator 12 generates an index for the Gaussian random number list stored in the look-up table 14 using a primitive polynomial modulo 2 operator, $x^{18} + x^5 + x^2 + x^1 + 1$. For ease of understanding, the term x(i, s) will indicate the i^{th} symbol of the sequence x, beginning with an initial seed s. The random number seed becomes reset to 1 upon the receipt of each film grain SEI message.

To form an individual 8x8 film grain block, a random block generator 16 reads 8 lines worth of 8 random numbers from the Gaussian random number look-up table 14. A random offset, from the random number generator 12, serves to access each line of 8 random numbers. Each line of the block produced by the block generator 16 is generated as following:

index = x(i, 1)
for n=0...7, B[i%8][n] = Gaussian_list[(index + n)%2048]

where i increments for each 8x1 block line

Claim 19 recites the following:

means for computing the average of the pixel values within the block;

Ample support for the "computing means" of claim 19 appears at page 8, lines 7-13 of applicants' specification which have been reproduced above in connection the "computing" step of claim 15. For the sake of brevity, applicants will not reproduce that section again.

Further, claim 19 recites:

means for randomly selecting, as a function of the average value of the image block, a block of bit accurate film grain from among a pool of previously established blocks of bit accurate film grain.

Ample support for the "randomly selecting means" of claim 19 step exists at page 8, lines 14-25 which have been reproduced above in connection the "randomly selecting step of claim 15. For the sake of brevity, applicants will not reproduce that section again. With regard to "bit accurate" film grain, applicants' specification, at page 7, lines 23-29, describes the use of a discrete integer transformation to yield the bit accurate film grain recited in claim 19.

Lastly, claim 19 recites:

means for blending each pixel in the selected block of bit accurate film grain with a corresponding pixel in the image block.

Ample support for applicants' "blending means" appears at page 8, lines 26 which provides:

> Following block selection, a deblocking filter 206 deblocks the pixels on the right most column of the previously selected block and on the left most column of the current block. An adder 208 adds the deblocked film grain block to decoded luma pixels. (Since two horizontally adjacent blocks are required to perform deblocking, there is a 1-block delay between the block selected in 204 and the block added in 208.) A clipper 210 clips the result within the range [0, 255] for display. Note that film grain noise addition only occurs to luma pixels.

6. Grounds of Rejection to be Reviewed on Appeal

Claims 15, 16, and 19 stand rejected under 35 U.S.C. § 102(e) as anticipated by US published patent application 2007/0058878A1 to Cristina Gomila et al. (Claims 17, 18 and 20 would be allowable if re-written to include all of the features of the base claim(s) from which they depend.)

Claims 15 and 21 had been rejected under 35 U.S.C. § 112. In the Advisory Action mailed June 7, 2010, the examiner has withdrawn the rejection under 35 U.S.C. § 112, leaving only the rejection under 35 U.S.C. § 102(e) for consideration in this appeal.

7. Argument

A. Introduction

Motion picture film possesses a characteristic quasi-random pattern, or texture, resulting from physical granularity of the film emulsion. Quite often, moderate grain texture presents a desirable feature in motion pictures. In some instances, the film grain provides visual cues that facilitate the correct perception of two-dimensional pictures. Film grade often varies within a

single film to provide various clues as to time reference, point of view, etc. Many other technical and artistic demands exist for controlling grain texture in the motion picture industry. Therefore, preserving the grainy appearance of images throughout image processing and delivery chain has become a requirement in the motion picture industry.

The film grain present in motion picture film constitutes a special form of high frequency noise which gets attenuated or even completely removed when a video file representing a copy of a motion picture film undergoes compression prior to transmission. Decoding of the compressed video file yields image which contain little if any film grain. Thus, the resultant decoded image will often appear flat.

Applicants conceived of their invention to simulate *bit accurate"* film grain for blending with a decompressed video image, thereby mimicking the original look and feel of the motion picture film. As compared to applicants' prior film grain simulation techniques, the simulation of bit accurate film grain yields greater repeatability because of the integer nature of the simulated film grain blocks.

B. Claims 15-20 are not anticipated under 35 U.S.C. §102(b) by U.S. Published Patent Application 2007/0-58878 to Gomila et al.

"Anticipation requires the presence in a single prior art reference disclosure of <u>each and every element of the claimed invention, arranged as in the claim</u>" (*Lindemann Maschinenfabrik GmbH v. American Hoist & Derrik Co.*, 730 F.2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1983)) (emphasis added).

Applicants claim 15 concerns a *method for simulating bit accurate film grain*" and includes the step of

> *randomly selecting, as a function of the average value of the image block, a block of bit accurate film grain from among a pool of previously established blocks of bit accurate film*

Claim 19 concerns *an apparatus for simulating bit accurate film grain* and recites the step of:

> *means for randomly selecting, as a function of the average value of the image block, a block of bit accurate film grain from among a pool of previously established blocks of bit accurate film grain.*

As discussed in applicants' previous responses, US Published Patent Application 2007/0058878 to Gomila et al. relied upon by the examiner to reject applicants' claims 15, 16, and 19 says absolutely nothing with regard to *bit accurate* film grain. In particular, the Gomila et al. published application says nothing with regard to how to generate bit accurate film grain, such as by the use of an integer transform, as described in applicants' specification. In view of the complete absence of any disclosure or suggestion in the cited Gomila published application as to the generation of *bit accurate* film grain, the examiner has not established a *prima* facie case of anticipation. In particular, the examiner has not specifically shown in the cited reference the generation of *bit accurate* film grain, as recited in applicants claims 15, 16 and 19.

In attempting to establish anticipation, notwithstanding the complete lack of any disclosure in the Gomila et al. published application regarding as to generating *bit accurate* film grain, the examiner asserts that Gomila et al. nonetheless generates *bit accurate* film grain. Without explicitly admitting to doing so, the examiner appears to rely on an inherency argument.

In explaining the inherency requirement, MPEP § 2112(IV) states the following:

> The fact that a certain result or characteristic <u>may</u> occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.' " *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted)

The term "bit accurate", as used in reference to film grain simulation, describes film grain simulation results that have repeatability. In other words, for the same values, the simulation process yields the same film grain simulation value. The film grain simulation technique described in the Gomila et al. published application makes use of a DCT transform process with no restriction on the generation of non-integer values. Because of truncation errors, the DCT transformation process described in the Gomila et al. reference will yield different results each time, giving rise to a lack of repeatability.

In contrast, applicants' film grain simulation process makes use of an integer DCT transform (see Page 7, lines 23-25 of applicants' specification and Integer DCT transform block 22 in FIG. 1 of applicants' drawings). Using an integer DCT transform enables applicants to generate bit accurate film grain. The Gomila et al published application makes no mention of integer transforms or any other mechanism for generating integer film grain values to repeatable results. The examiner cannot argue that the Gomila et al. published application generates bit accurate film grain in the absence of any mechanism in that reference, such an integer DCT transform that explicitly provides for integer film grain blocks.

Further, with regard to the issue of inherency, the Federal Circuit in *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999) noted the need for extrinsic evidence of necessity, stating:

> In finding anticipation by inherency, the Board ignored the foregoing critical principles. The Board made no attempt to show that the fastening mechanisms of Wilson that were used to attach the diaper to the wearer also "necessarily" disclosed the third separate fastening mechanism of claim 76 used to close the diaper for disposal, or that an artisan of ordinary skill would so recognize. It cited no extrinsic evidence so indicating.

The above passage applies to the present case since the Examiner has made no attempt to show the need for bit accuracy. In particular, the Examiner has failed to cite any extrinsic evidence whatsoever which supports the position that Gomila et al. inherently achieves bit accuracy. Therefore, applicants respectfully assert that the Gomila et al published application does not inherently disclose the bit accurate film grain block selection recited in claims 15, 16, and 19. Accordingly, applicants request reversal of the rejection of these claims.

C. Conclusion

For the reasons given above, the cited references fail to disclose or suggested the recited features of applicants' claims. Accordingly, applicants request that the Board reverse the rejections of Claims 15, 16 and 19 under 35 U.S.C. § 102(e).

Please charge the amount of $540.00, covering fee associated with the filing of the Appeal Brief, to **Thomson Licensing Inc., Deposit Account No. 07-0832.** In the event of any non-payment or improper payment of a required fee, the Commissioner is authorized to charge **Deposit Account No. 07-0832** as required to correct the error.

Respectfully submitted,
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8. CLAIMS APPENDIX

Claim 1 (cancelled)

Claim 2 (cancelled)

Claim 3. (Cancelled)

4. (Withdrawn) A method for creating a block of M x N pixels with film grain, where N and M are integers greater than zero, comprising the steps of:

receiving film grain information that includes at least one parameter that specifies an attribute of the film grain to appear in the block;

creating a block of M x N random values selected from a previously established list of Gaussian random numbers;

computing an Discrete Cosine Transform of the M x N block of random numbers;

filtering the M x N coefficients resulting from the Discrete Cosine Transform by at least one parameter in the received film grain information;

computing an Inverse Discrete Cosine Transform of the filtered set of coefficients;

scaling all the pixel values in the block as indicated by one parameter in the received film grain information; and

storing the created block of film grain into a pool of film grain blocks.

5. (Withdrawn) The method according to claim 4 further comprising the step of performing an integer approximation of a Discrete Cosine Transform (DCT) and the Inverse Discrete Cosine Transform (IDCT) to reduce complexity.

6. (Withdrawn) The method according to claim 4 further comprising the step of scaling top and bottom edges of the created film grain block to hide block edges.

7. (Withdrawn) The method according to claim 4 wherein the step of receiving the film grain information further comprises the step of decoding a Supplemental Enhancement Information message containing the at least one parameter.

Claim 8 (cancelled)

Claim 9 (cancelled)

Claim 10. (cancelled)

11. (Withdrawn) An apparatus for creating a block of M x N pixels with film grain, where N and M are integers greater than zero, comprising:

means for receiving film grain information that includes at least one parameter that specifies an attribute of the film grain to appear in the block;

means for creating a block of M x N random values selected from a previously established list of Gaussian random numbers;

means for computing an Discrete Cosine Transform of the M x N block of random numbers;

means for filtering the M x N coefficients resulting from the Discrete Cosine Transform by at least one parameter in the received film grain information;

means for computing an Inverse Discrete Cosine Transform of the filtered set of coefficients;

means for scaling all the pixel values in the block as indicated by one parameter in the received film grain information; and

means for storing the created block of film grain into a pool of film grain blocks.

12. (Withdrawn) The apparatus according to claim 11 further comprising means for performing an integer approximation of a Discrete Cosine Transform (DCT) and the Inverse Discrete Cosine Transform (IDCT) to reduce complexity.

13. (Withdrawn) The apparatus according to claim 11 further comprising the means for scaling top and bottom edges of the created film grain block to hide block edges.

14. (Withdrawn) The apparatus according to claim 11 wherein means for receiving the film grain information further comprises means for decoding a Supplemental Enhancement Information message containing the at least one parameter.

15. (Rejected) A method for simulating bit accurate film grain in an image block, comprising the steps of:

computing the average of the pixel values within the image block;

randomly selecting, as a function of the average value of the image block, a block of bit accurate film grain from among a pool of previously established blocks of bit accurate film grain.

16. (Rejected) The method according to claim 15 further including the step of blending each pixel in the selected film grain block with a corresponding pixel in the image block.

17.(Objected to) The method according to claim 15 wherein the step of randomly selecting a film grain block further includes the step of accessing a look up table containing random numbers to obtain a random number.

18.(Objected to) The method according to claim 16 further comprising the step of populating the look-up table in advance of film grain simulation with random numbers generated by a random number generator.

19. (Rejected) Apparatus for simulating bit accurate film grain in an image block, comprising:

means for computing the average of the pixel values within the block;

means for randomly selecting, as a function of the average value of the image block, a block of bit accurate film grain from among a pool of previously established blocks of bit accurate film grain; and

means for blending each pixel in the selected block of bit accurate film grain with a corresponding pixel in the image block.

20.(Objected to) The apparatus according to claim 19 wherein the means for randomly selecting a film grain block further comprises a look up table containing random numbers.

Claim 21. (cancelled)

9. RELATED EVIDENCE APPENDIX

None.

10. RELATED PROCEEDINGS APPENDIX

None